

# **ELECTRONIC PERFORMANCE SUPPORT**

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**XYBERNAUT WEARABLE  
COMPUTERS IN AN  
OPERATIONAL ENVIRONMENT**

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# WITHOUT THE RIGHT SOFTWARE...

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✱ TEAMED WITH MAINTENANCE MENTORING SYSTEM.

- ✱ ELECTRONIC PERFORMANCE SUPPORT SYSTEM(EPSS) DESIGNED FOR MAINTAINERS

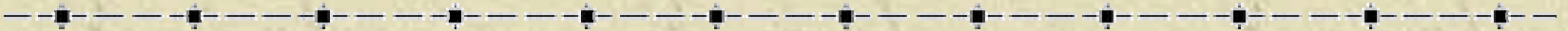
✱ NATURAL FIT

- ✱ XYBERNAUT OPTIMIZES MOBILE COMPUTING.

- ✱ MMS DESIGNED FOR INDEPENDENT USE ON THE FLIGHTLINE.



# EPSS?



## ✦ ELECTRONIC PERFORMANCE SUPPORT SYSTEMS

✦ INTEGRATED, ON-DEMAND ACCESS TO  
INFORMATION, ADVICE, LEARNING  
EXPERIENCES AND TOOLS TO ENABLE  
A HIGH LEVEL OF PERFORMANCE,  
REGARDLESS OF USER EXPERTISE.

(GLORIA GERY/BARRY RAYBOULD)

# MMS?

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✧ REPURPOSE EXISTING DATA FROM VARIOUS SOURCES INTO A FORMAT INTUITIVE TO A MAINTAINER.

✧ FANCY WEB SITE

- ✧ DATABASE: XML, ACCESS, ORACLE
- ✧ ACTIVE SERVER PAGES
- ✧ INFO IS ACCESSED AND LINKED BASED ON USER SELECTIONS.



# OUR TASK

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✠ EVALUATE WEARABLE COMPUTING TECHNOLOGY(XYBERNAUTS) FOR EFFECTIVITY IN AN OPERATIONAL ENVIRONMENT.

✠ SINCE, WITHOUT THE RIGHT SOFTWARE...EVALUATE THE IMPACTS OF INCORPORATING AN EPSS IN AN OPERATIONAL ENVIRONMENT.

# TECHNICAL ENVIRONMENT

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✱ AH-1W COBRA: LEGACY, OUT-OF-  
PRODUCTION AIRCRAFT WITH  
PAPER-BASED MANUALS.

- ✱ INCONSISTENCY IN PUBLICATION FORMATS.
- ✱ PUBS TRANSITIONED TO PDF FORMAT AND DISTRIBUTED ON CDs
- ✱ INCREASINGLY COMPLEX SYSTEMS WITH MINIMAL ADVANCED TRAINING FOR TECHNICIANS.



# TECHNICAL ENVIRONMENT cont.

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- ✱ MANDATED USE OF MANUALS AND ADHEARANCE TO PUBLISHED PROCEDURES.
  - ✱ ACCESSING INFORMATION IS A SKILL IN ITSELF

# PHYSICAL ENVIRONMENT

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- ✱ HIGH, INCONSISTENT NOISE.
- ✱ HIGH WIND (TURNING AIRCRAFT).
- ✱ HIGH OPERATIONAL TEMPO
- ✱ LIMITED PARTS AVAILABILITY
- ✱ TYPICALLY TWO PERSON JOBS



# HARDWARE OBSERVATIONS



## ✧ CONFIGURATION IS CRITICAL

- **THREE OF FIVE XYBERNAUT CONFIGURATIONS REJECTED.**
- **ONE CLEAR CHOICE IN XYBERNAUT OPTIONS**
- **GENERALLY XYBERNAUT POUCH CONFIGURATION PREFERRED OVER PANASONIC**
- **SENIOR TECHNICIANS TEND TO PREFER PANASONIC**
- **JUNIOR TECHNICIANS PREFER XYBERNAUT**

# HARDWARE OBSERVATIONS cont.

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## ✧ XYBERNAUT SYSTEM FLEXIBILITY PROVIDES ADVANTAGE

- ✧ SUPPORTS HUD FOR LOW LIGHT/NO WHITE LIGHT CONDITIONS
- ✧ SUPPORTS VOICE COMMANDS
- ✧ CONFIGURATION FLEXIBILITY BASED ON REQUIREMENT.



# HARDWARE

## CONCLUSIONS TO-DATE

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- ✦ WEARBLE COMPUTERS ARE VIABLE OPTION AND PREFERRED IN SOME SCENARIOS.
- ✦ RIGHT SOFTWARE IS CRITICAL OR HARDWARE BECOMES DETRIMENT.
- ✦ MULTIPLE CONFIGURATIONS CAN CREATE CONFUSION.
- ✦ ACCEPTANCE INCREASED WITH FAMILIARIZATION.
- ✦ TRANSITION FROM TOY TO TOOL.

# EPSS OBSERVATIONS

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✱ PDF FORMAT WHOLLY REJECTED BY JUNIORS AND SENIORS REGARDLESS OF HARDWARE USED.

- ◆ NO FLEXIBILITY. MUST SCROLL PAGES LOOKING FOR DATA.
- ◆ LIMITED LINKS.
- ◆ NO MULTIPLE SCREENS.
- ◆ ADDED COMPLEXITY AND TIME TO PERFORM.
- ◆ HIGH FRUSTRATION LEVEL



# EPSS OBSERVATIONS cont.

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✱ ALL JUNIOR TECHNICIANS AND SOME SENIOR TECHNICIANS CLEARLY UNCOMFORTABLE WITH PAPER PUBS.

- LOST PLACE
- SKIPPED STEPS/WRONG STEPS TAKEN.
- MULTIPLE PUBLICATIONS OPEN AT ONE TIME.
- MANY SENIOR TECHNICIANS REVERTED TO TROUBLESHOOTING FROM THE HIP.
- FRANTIC ATMOSPHERE CREATED BY SENIOR TECHNICIANS.

# EPSS OBSERVATIONS cont.

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- ✧ CONFIDENCE LEVELS INCREASE IN JUNIORS AND SENIORS WHEN USING EPSS.
- ✧ 100% COMPLIANCE WITH PUBLISHED PROCEDURES WHEN USING EPSS.
- ✧ USER ACCEPTANCE OF EPSS IS FAR FASTER AND BROADER THAN EXPECTED.
- ✧ USER TRAINING TIME PROVIDED:
  - EPSS: 30 MINUTES
  - PAPER PUBLICATIONS: 50+ HOURS
- ✧ TRAINING TAKES PLACE WITH EPSS NOT WITH PAPER



# EPSS OBSERVATIONS cont.

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- ✱ EXPECTED CULTURAL BARRIERS AT LOWER LEVELS NOT ENCOUNTERED.
- ✱ TIME TO COMPLETION IMPROVES WITH USE.
- ✱ TWO INEXPERIENCED TECHNICIANS USING EPSS PERFORMED AT ALMOST SAME LEVEL AS TWO EXPERIENCED TECHNICIANS USING PAPER.

# EPSS CONCLUSIONS TO- DATE

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- ✱ MMS IS POTENTIAL FORCE MULTIPLIER.
  - ✱ CLEAR USER PREFERENCE.
  - ✱ EASE OF INFORMATION ACCESS REDUCES TIME.
  - ✱ MMS INCREASES MENTORING AND KNOWLEDGE TRANSFER.
  - ✱ DECREASED TRAINING TIME.
  - ✱ JUNIORS FUNCTION AT MORE SENIOR LEVEL.



# EPSS CONCLUSIONS cont.

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## ✦ ACCURACY INCREASED.

- ✦ 100% PROCEDURE COMPLIANCE.
- ✦ INCREASED SAFETY AWARENESS.
- ✦ REDUCED AD-HOC TROUBLESHOOTING.

## ✦ TECHNICIANS MORE INVOLVED IN PROCESS IMPROVEMENT.

- ✦ COMMENTS
- ✦ TECH PUB DEFICIENCY REPORTING

# BARRIERS

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✱ COMPETING INTERESTS CREATE DEFENSIVE ENVIRONMENT.

- ✦ MYOPIC VIEWPOINTS

- ✦ AMBIVILANCE

✱ COMPETING INITIATIVES CREATE OVERLOAD FOR SUPPORTERS.

- ✦ JUST ANOTHER CONTRACTOR.

✱ CULTURAL AT MID-LEVEL (NAVAIR)



# BARRIERS cont.

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✱ LEVEL OF EFFORT DID NOT SUPPORT POTENTIAL FINDINGS.

- ◆ RETURN ON INVESTMENT
- ◆ BUSINESS CASE ANALYSIS
- ◆ OVERALL LOGISTICAL IMPACT
- ◆ READINESS?

# AREAS FOR MORE RESEARCH

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## ✧ MMS IMPACT ON READINESS

- ✧ MORE SYSTEMS COVERED FOR BROADER LOOK.

- ✧ PREVIOUS SLIDE.

## ✧ ENVIRONMENTAL IMPACTS ON HARDWARE.

## ✧ CONTINUE TO TRANSITION ADD-ONS FROM TOY TO TOOL.

## ✧ EPSS IMPACT ON TRAINING.